

I claim:

- SUB A1
1. In a multiprocessor computer system having multiple interconnected processing nodes each with one or more processors and physical memory, a data structure for storing execution history data indicative of states of threads that are used for providing mutual exclusion between current and next generation data elements, comprising:
- 5 a first level bit mask stored in memory and containing a bit per node, the bit indicating whether the corresponding node contains a processor that has not yet passed through a quiescent state; and
- 10 a second level bit mask stored in the memory of each processing node and containing a bit per processor, the bit indicating whether the corresponding processor has not yet passed through a quiescent state.
2. In a multiprocessor computer system having multiple interconnected processing nodes each with one or more processors and physical memory, a data structure for storing a number of the current generation of data elements being processed by a processor on a node, the data structure comprising a variable stored in the memory of each node and containing the current generation number.
- 15 3. In a multiprocessor computer system having multiple interconnected processing nodes each with one or more processors and physical memory, a method for a processor to maintain a summary of thread activity as part of a method for providing mutual exclusion between current and next generation data elements, comprising:
- 20 determining from a data structure on the processor's node if the processor has passed through a quiescent state;
- 25 if so, determining from a data structure on the processor's node if all other processors on its node have passed through a quiescent state; and
- if so, indicating in a data structure accessible to all nodes that all processors on the processor's node have passed through a quiescent state.
4. The method of claim 3 wherein if the processor determines from the data structure on the processor's node that the processor has not passed through a quiescent state, having a callback processor check if the processor has passed
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through a quiescent state and, if so, having the processor indicate in the data structure that it has passed through a quiescent state.

- 5 5. The method of claim 3 wherein if the processor determines from the data structure accessible to all nodes that the processor is the last processor to pass through a quiescent state, having the processor update a data structure stored in the memory of each node for storing a number of the current generation of elements being processed on the node.

- 10 6. The method of claim 3 wherein if the processor determines from the data structure accessible to all nodes that it is the last processor to pass through a quiescent state, having a callback processor determine if there are callbacks waiting for a subsequent generation, and, if so, updating the data structure on each node and the data structure accessible to all nodes to indicate that all processors need to pass through an additional quiescent state.

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